

The utility of Problem Areas in Diabetes (PAID) scale amongst patients with Type 2 diabetes (T2DM): An experience from a teaching hospital in Southern India

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ABSTRACT

Objectives: The purpose of this study was to establish the prevalence of diabetes-specific psychological distress (DSPD) among patients with type 2 diabetes mellitus (T2DM) using the “Problem areas in diabetes” (PAID) scale at a teaching hospital in southern India. Other objectives included observing the relationship between socio-demographic factors and DSPD and, finally exploring the level of acceptance of the PAID scale by Asian-Indian patients. **Methods:** The patients with T2DM aged >18 years attending the diabetes outpatient clinic were recruited. They completed two sets of questionnaires; PAID and a satisfactory questionnaire, which included socio-demographic characteristics and questions relating to the acceptance of PAID. Statistical analysis was performed using Stata 13.1 and Excel. **Results:** A total of 253 questionnaires were completed, including 157 (62.1%) male and 96 (37.9%) female patients. The prevalence of DSPD was 32.8% (83/253). Younger age (OR 3.65, 95% CI 1.36–9.80) and presence of retinopathy (OR 2.60, 95% CI 1.12–6.04) were significantly associated with DSPD. However, it was observed that one-third of the patients had an elevated level of distress regardless of socio-demographic or clinical factors. PAID was well accepted by the participants and 84.6% (214/253) were pleased to complete it again. **Conclusion:** About one-third of the patients with T2DM had DSPD. Psychological distress was higher in the younger age group and those with retinopathy. PAID is an easy, well-accepted questionnaire and would serve as a useful tool to screen for DSPD.

Keywords: India, Problem Areas In Diabetes, psychological distress, type 2 Diabetes mellitus

Introduction

Diabetes mellitus (DM) affects millions of people worldwide; however, it is more pronounced in the Indian subcontinent.^[1] Studies report that between 2000 and 2030, the greatest absolute increase in the number of people with diabetes will be in India.^[2]

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Type 2 diabetes mellitus (T2DM) accounts for 90% of all diabetes and India has seen a substantial rise in its prevalence along with a shift in diagnosis of T2DM in the younger population.^[1,3-5] This shift in the age of diagnosis is of concern as it may have adverse consequences on the nation's health and economy.

The main focus of diabetes management is on lifestyle changes and pharmacotherapy. Optimal self-management requires a significant amount of time and effort. As is the case with all

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chronic diseases, psychological distress can have a detrimental impact on diabetes self-management.^[6,7] The burden of self-care and pharmacological therapy, especially with insulin injections may overwhelm or burn-out patients.^[8,9] Adjustment to the disease is often associated with various negative emotional responses including anger, guilt, frustration, denial and loneliness.^[10] The impact of glycaemic control and its effect on long-term complications may also aggravate feelings of fear and depression.^[8] These responses are classified as 'Diabetes-specific Psychological Distress (DSPD)'. It is a separate entity from general emotional distress and was developed to specifically assess psychological distress related to diabetes.^[9] The estimated prevalence of psychological distress in diabetes ranges from 18 to 52%.^[9] With an increasing prevalence of T2DM at a younger age in India, it seems imperative to identify and manage psychological distress related to diabetes effectively.^[11]

Quality of life (QoL) is assessed using self-reported questionnaires.^[11] Problem areas in diabetes (PAID) is a well-validated, easy-to-administer, 20-item scale that measures DSPD.^[12,13] PAID uses a five-point Likert scale to assess the response to each item. The total score ranges from 0 to 100, achieved by summing 0–4 responses to 20 PAID items and multiplying the sum by 1.25.^[14] A score of ≥ 40 denotes elevated levels of distress.^[12–14] Psychometric reports to date on the PAID scale, have shown it to have a consistently high internal reliability (Cronbach's alpha = 0.95) and a sound two-month test–retest reliability ($r = 0.83$) in a group of patients.^[14] It has also been demonstrated to be strongly associated with general emotional distress, depression, diabetes self-care behaviours, diabetes coping, and health beliefs; and to be a statistically significant predictor of glycaemic control in a study that tracked HbA1C for a diabetes population for one year.^[8,12,14,15] A large proportion of patients with T2DM are managed by primary care physicians. Assessment of DSPD using the PAID scale aids primary care providers to identify the barriers for diabetes self-management, and would guide treatment directed at overcoming the barriers, which in turn would result in better long-term diabetes control and reduction of its chronic complications.

The main purpose of this study was to establish the prevalence of DSPD among type 2 diabetes outpatients at a southern Indian teaching hospital, using the PAID questionnaire. The secondary objectives were to ascertain the relationship between socio-demographic factors and DSPD, and finally to explore the level of acceptance of the PAID scale by Indian subjects with diabetes.

Materials and Methods

Study setting and subjects

This cross-sectional single-centre study was conducted at the Christian Medical College in Vellore, Tamil Nadu, India, from 7 January to 11 February 2015. The patients with T2DM, aged more than 18 years, attending the diabetes outpatient clinic at the Department of Endocrinology were eligible. Patients with

other types of diabetes and those with a previous diagnosis of a psychiatric disorder were excluded.

Study design and data collection

Eligible participants were approached by the principal investigator whilst waiting at the diabetes outpatient clinic. Details of the study were explained verbally and a study information leaflet was given. Signed informed consent was obtained from all interested participants prior to administration of the PAID questionnaire in Tamil/English. They were also asked to complete a satisfactory and clinical indicators questionnaire which included socio-demographic characteristics (age, gender, place of residence, education, marital status, employment status, height and weight), information pertaining to their diabetes (duration of diabetes, associated medical problems, diabetes medications and adherence to medications) and complications (self-reported diabetic retinopathy, neuropathy, nephropathy, peripheral vascular disease [PVD], coronary artery disease [CAD] and foot problems). History of smoking and alcohol consumption were also recorded. The PAID scale was translated to Tamil by local bi-lingual experts, and independently back-translated to check for accuracy. It needed about 15 minutes to complete the two sets of questionnaires. Approval was obtained from the Institutional Review Board (IRB) and Ethics committee [IRB Min number 9227, dated 17.12.2014].

Sample size

DSPD has not been assessed using the PAID scale among the patients with T2DM from India. Hence, assuming a conservative estimate of a 50% prevalence of diabetes-related psychological distress with 7% precision, we had to screen 216 patients with T2DM.

Statistical analysis

The data were entered into EpiData software and analysed using Stata 13.1. The PAID score of ≥ 40 was considered to represent the presence of DSPD. The prevalence and 95% confidence intervals (CIs) of DSPD were estimated. A Chi-square test was used to find the association between binary or nominal socio-demographic, diabetes-related factors, complications and presence of DSPD and Chi-square test for trend for the ordinal factors. The strength of the association was expressed as odds ratio (OR). The relationship between BMI and DSPD was modelled using spline logistic regression and a test of difference in slopes was used to check the assumption of linearity.^[16] Factors such as age, number of self-reported complications of T2DM, retinopathy and BMI which were significant at 0.20 level on univariate analysis were considered for multivariate analysis. Multiple logistic regression was used to find the independent effect of each factor on psychological distress. A final model was derived by including factors that were statistically significant at a level of 0.05. The Hosmer-Lemeshow's goodness-of-fit statistics ($P > 0.05$) was used to evaluate model fit.^[17,18] A receiver operating characteristic (ROC) curve was constructed by comparing the predicted probability of DSPD from the final model. A P value < 0.05 was considered statistically significant.

Results

A total of 253 questionnaires were completed: 154 in Tamil and 99 in English. The majority of the subjects were males (62.1%), aged 45–64 years (61.3%), from urban areas (64%) and married (88.1%). About one-third of subjects reported having been to college (34.8%). Nearly half of the study subjects (50.2%) had T2DM for more than 10 years [Table 1]. In all, 177 (70%) subjects reported one or more complications; neuropathy (42.7%) was the commonest, followed by foot problems (34.0%) [Table 2]. One or more additional illness other than T2DM was reported by 54.5% patients. Majority (51.4%) were on two anti-hyperglycaemic medications; generally, a very high level of adherence to medication (94.9%) was reported [Table 3].

Prevalence of DSPD

The median of the PAID score was 27.5 with an interquartile range (IQR) of 12.5 and 45.0. The prevalence of DSPD in this study was 32.8% (83/253) with a 95% CI of 27%–39%, suggesting that about one-third of the patients had a greater level of distress.

A feeling of distress about living with diabetes was not uncommon. All of the 20 items on the PAID scale were reported as a serious problem (score 4 on PAID) more than once [Figure 1]. ‘Worrying about the future and possibility of serious complications’ was the most frequently reported serious issue. ‘Feeling scared, angry, depressed, overwhelmed and guilty, not having clear goals and not accepting diabetes’ were also quoted as serious problems frequently. Alternatively, some issues were rarely perceived as distressing, such as ‘feeling unsatisfied with your diabetes physician’ and ‘feeling that friends and family are unsupportive’.

Impact of Socio-demographic and clinical factors on psychological distress

Tables 1–3 show the relationship of the baseline demographic and clinical factors to the PAID score.

A lower age ($P = 0.023$) and presence of diabetic retinopathy ($P = 0.010$) were found to have a statistically significant association with the PAID score in the univariate analysis. Body mass index (0.081), greater number of complications ($P = 0.028$), known nephropathy ($P = 0.166$), and having peripheral vascular disease ($P = 0.108$) were significantly associated with DSPD (on univariate analysis at 0.20 level). The relationship between BMI and DSPD was linear ($P = 0.34$) using a test for difference in slopes after a spline logistic regression.

Gender, employment, education, marital status and the duration of T2DM showed no significant association. Similarly, no significant association was found between the number of additional illnesses, diabetes medications, adherence to medications and the PAID score. However, it was observed that

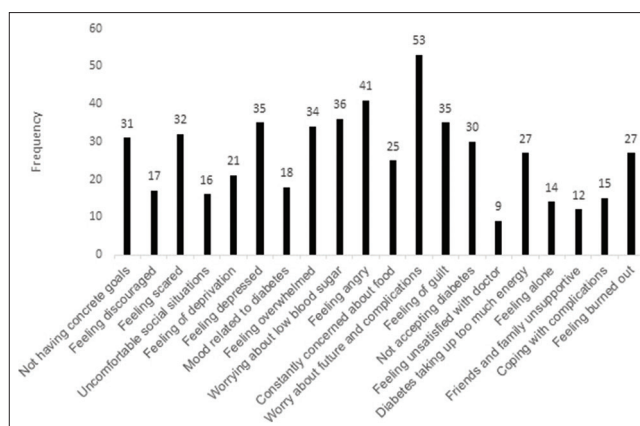


Figure 1: Line graph showing the frequency in which the 20 PAID items were scored as a serious problem

one-third of the sample within each of the factor groups had a high PAID score; for example, around 30% in each group of the ‘duration of diabetes’ had DSPD. Therefore, regardless of the socio-demographic or clinical factors about one-third of the sample was psychologically distressed.

From the multiple logistic regression, it was observed that the adjusted odds of having psychological distress was 3.65 (95% CI 1.36–9.80) times more for those aged between 25 and 44 years, and 2.53 (95% CI 1.23–5.21) times more for the age group of 45–64 years when compared with those older than 65 years. When self-reported complications were assessed, retinopathy had an OR of 2.60 (95% CI 1.12–6.04) for DSPD [Table 4]. For each unit increase in BMI, the odds of DSPD increase by 1.07 (95% CI 1.01–1.14). In the stepwise backward selection method, the P value for an overall effect of the number of complications on DSPD was 0.071 showing a trend towards increased distress in those with a greater number of complications of diabetes. Thus, age, retinopathy, number of complications and BMI were retained by the model. The Hosmer-Lemeshow goodness-of-fit statistics revealed that the model’s prediction was similar to the observed ($P = 0.61$). The area under the curve of the ROC curve was 0.68 (95% CI 0.61–0.75).

Acceptance of PAID questionnaire

The questionnaire was generally well accepted. More than 90% (228/253) found PAID easy to complete, and 84.6% (214/253) were willing to do it again. Also, the majority (83%) of subjects suggested that PAID was appropriate for the Indian population. The most confusing question was item number 20 – ‘Feeling ‘burned out’ by the constant efforts to manage diabetes’ and this also was the question that most people were not happy to answer.

Discussion

The purpose of this study was to establish the prevalence of DSPD among patients with T2DM using the PAID scale. The prevalence of DSPD in T2DM was 32.8%. Similar findings

Table 1: Characteristics of study population and their association with DSPD

Variables	Study (n=253)	Prevalence of DSPD (PAID Score ≥40)		Univariate	
		n (%)	95% CI	OR (95% CI)	P
Age (years)					
25-44	30 (11.9)	13 (43.3)	25.5-62.6	2.95 (1.16-7.48)	0.023
45-64	155 (61.3)	56 (36.1)	28.6-44.2	2.18 (1.11-4.28)	0.023
≥65	68 (26.9)	14 (20.6)	11.7-32.1	1.00	
Gender					
Male	157 (62.1)	51 (32.5)	25.2-40.4	1.00	
Female	96 (37.9)	32 (33.3)	24.0-43.7	1.04 (0.61-1.78)	0.889
Residence					
Rural	91 (36)	31 (34.1)	24.4-44.7	1.00	
Urban	162 (64)	52 (32.1)	24.9-39.9	0.91 (0.53-1.58)	0.749
Education					
Illiterate	24 (9.5)	10 (41.7)	22.1-63.4	1.61 (0.64-4.09)	0.313
Primary	60 (23.7)	19 (31.7)	20.3-44.9	1.05 (0.52-2.13)	0.899
Secondary	81 (32)	27 (33.3)	23.2-44.7	1.13 (0.59-2.16)	0.712
College	88 (34.8)	27 (30.7)	21.3-41.4	1.00	
Marital Status					
Unmarried	13 (5.1)	5 (38.5)	13.9-68.4	1.00	
Married	223 (88.1)	71 (31.8)	25.8-38.4	0.75 (0.24-2.36)	0.620
Separated	17 (6.7)	7 (41.2)	18.4-67.1	1.12 (0.25-4.91)	0.880
Smoking					
Non-smoker	182 (71.9)	62 (34.1)	27.2-41.4	1.00	
Smoker	29 (11.5)	8 (27.6)	12.7-47.2	0.74 (0.31-1.76)	0.492
Ex-Smoker	42 (16.6)	13 (30.9)	17.6-47.1	0.87 (0.42-1.79)	0.700
Alcohol					
No	220 (87)	69 (31.4)	25.3-37.9	1.00	
Yes	33 (13)	14 (42.4)	25.5-60.8	1.61 (0.76-3.40)	0.210
Employment					
Employed	106 (41.9)	38 (35.9)	26.8-45.7	1.00	
Unemployed	147 (58.1)	45 (30.6)	23.3-38.7	0.79 (0.46-1.34)	0.382
Duration of diabetes					
<1 year	17 (6.7)	4 (23.5)	06.8-49.9	1.00	
1-2 years	22 (8.7)	7 (31.8)	13.9-54.9	1.52 (0.56-6.37)	0.570
2-5 years	36 (14.2)	15 (41.7)	25.5-59.2	2.32 (0.63-8.53)	0.205
5-10 years	51 (20.2)	17 (33.3)	20.8-47.9	1.63 (0.46-5.75)	0.451
>10 years	127 (50.2)	40 (31.5)	23.5-40.3	1.49 (0.46-4.87)	0.505
BMI (mean, SD)	27.6 (4.4)	28.3 (4.5)	27.1-28.1	1.05 (0.99-1.12)	0.081

were reported from Malaysia and Germany (36% and 30.8%, respectively) with the PAID scale.^[19,20] A study from Southern India used Diabetes Distress Scale (DDS-17) and reported that diabetes distress is 27.9%.^[21]

Anxiety regarding future complications was the most prominent distress, followed by emotional feelings related to diabetes such as feeling angry, depressed, guilty, overwhelmed, scared, concerns about low blood sugar levels or difficulty accepting their diabetes. Similar findings were also reported in previous studies.^[8,12,19,20,22,23] Identifying individual concerns helps physicians focus on those aspects while counselling patients, which would improve coping skills and diabetes self-management. Of interest, serious dissatisfaction with the diabetes physician was uncommon.

When we looked at the association of socio-demographic and clinical factors with the PAID score, only younger age and

diabetic retinopathy showed significant association on univariate analysis. Other studies have also reported a higher level of DSPD among younger patients.^[24-27] Younger patients may perceive a chronic illness like diabetes as an obstacle to their life and cope less effectively than older adults.^[25] Commitment to strict lifestyle changes and pharmacological regimens in T2DM may be particularly challenging for young patients with changing life circumstances, making them more prone to DSPD. In a cross-sectional study from Australia, Reddy *et al.* reported that the PAID score correlated positively with HbA1C.^[23]

Self-reported diabetic retinopathy was associated with a 2.5-fold increased risk of DSPD in this study. A study by Polonsky *et al.* also reported a significantly higher PAID score with diabetic retinopathy.^[8] Diabetic retinopathy is associated with marked psychological distress due to reduced functional ability, social isolation, and increased financial burden.^[9,28] Close attention

Table 2: Association of complications of T2DM with psychological distress

Complications	Study n=253	Prevalence of DSPD (PAID Score ≥40)		Univariate	
		n (%)	95% CI	OR (95% CI)	P
Retinopathy					
No	171 (67.6)	47 (27.5)	20.9-34.8	1.00	
Yes	82 (32.4)	36 (43.9)	32.9-55.3	2.06 (1.19-3.58)	0.010
Neuropathy					
No	145 (57.3)	47 (32.4)	24.9-40.7	1.00	
Yes	108 (42.7)	36 (33.3)	24.6-43.1	1.04 (0.61-1.77)	0.878
Nephropathy					
No	234 (92.5)	74 (31.6)	25.7-38.0	1.00	
Yes	19 (7.5)	9 (47.4)	24.4-71.1	1.95 (0.76-4.99)	0.166
Peripheral vascular disease					
No	184 (72.7)	55 (29.9)	23.4-37.1	1.00	
Yes	69 (27.3)	28 (40.6)	28.9-53.1	1.6 (0.90-2.85)	0.108
Coronary artery disease					
No	222 (87.8)	73 (32.9)	26.7-39.5	1.00	
Yes	31 (12.3)	10 (32.3)	16.7-51.4	0.97 (0.44-2.17)	0.945
Foot problems					
No	167 (66.0)	52 (31.1)	24.2-38.8	1.00	
Yes	86 (34.0)	31 (36.0)	25.9-47.1	1.25 (0.72-2.16)	0.431
Number of complications					
None	76 (30.0)	21 (27.6)	17.9-38.8	1.00	
1	63 (24.9)	22 (34.9)	23.3-47.9	1.41 (0.68-2.89)	0.356
2	48 (19.0)	10 (20.8)	10.5-34.9	0.69 (0.29-1.63)	0.396
>2	66 (26.1)	30 (45.5)	33.1-58.2	2.18 (1.09-4.39)	0.028

Table 3: Self-reported comorbidities among T2DM

Comorbidity	Study (n=253)	Prevalence of DSPD (PAID Score ≥40)		Univariate	
		n (%)	95% CI	OR (95% CI)	P
Additional illness					
None	115 (45.5)	45 (39.1)	30.2-48.7	1.00	
1	88 (34.8)	21 (23.9)	15.4-34.1	0.49 (0.26-0.90)	0.022
≥2	50 (19.8)	17 (34.0)	21.2-48.8	0.80 (0.40-1.61)	0.532
Anti-diabetic medication					
1	76 (30.2)	20 (26.3)	16.9-37.7	1.00	
2	130 (51.6)	49 (37.7)	29.3-46.6	1.69 (0.91-3.15)	0.097
>2	46 (18.3)	14 (30.4)	17.7-45.8	1.23 (0.55-2.75)	0.623
Adherence to medication					
Always	240 (94.9)	79 (32.9)	27.0-39.3	1.00	
Sometimes	12 (4.7)	3 (25.0)	5.5-57.2	0.68 (0.18-2.58)	0.570
No	1 (0.4)	1 (100.0)	-		

to these high-risk groups is essential to reduce diabetes-related psychological distress and its negative influence on diabetes self-management and glycaemic control.

Furthermore, we observed that a greater number of complications of diabetes and higher BMI were associated with greater odds of developing DSPD. Obesity is a well-identified risk factor for psychological distress. Diabetes-related complications that included nephropathy and peripheral vascular disease also showed a greater association with DSPD compared to other comorbidities. However, neuropathy had a greater association with psychological distress in other published studies.^[27] In our study, though neuropathy was the commonest complaint, it was

not significantly associated with DSPD. Of interest, a larger proportion of studies on DSPD report a reciprocal link in which psychological distress leads to obesity and diabetes complications due to inactivity and poor glycaemic control.^[29] The association could thus be interpreted as a vicious cycle, emphasising the need to identify factors contributing to psychological distress in individual patients, and suggesting coping strategies.

Female gender, lower educational status, being single, longer duration of diabetes, smoking and alcohol consumption, and low income have been reported to be associated with the increased risk of depression and psychological distress in diabetes.^[7,27,28,30] Our study did not show any significant association between these

Table 4: Multiple logistic regression of DSPD and socio-demographic and morbidity factors

Risk factors	OR [†] (95% CI)	P
Age		
25-44	3.65 (1.36-9.80)	0.010
45-64	2.53 (1.23-5.21)	0.011
≥65	1.00	
Retinopathy		
No	1.00	
Yes	2.60 (1.12-6.04)	0.026
No of complications		
None	1.00	
1	1.39 (0.65-2.98)	0.396
2	0.42 (0.15-1.17)	0.097
>2	1.18 (0.43-3.22)	0.749
Body Mass Index	1.07 (1.01-1.14)	0.045

[†]Multiple regression adjusted for age, gender and residence

factors and DSPD. Nevertheless, an interesting observation was that regardless of socio-demographic and clinical factors, one-third of the subjects in all groups had DSPD (PAID score ≥40). Consequently, it is necessary to screen all patients with diabetes for DSPD, and not only the perceived high-risk groups. The majority of the patients with T2DM are managed by primary care physicians. Assessment for DSPD using the PAID scale can lead to individualized diabetes education addressing the identified barriers and needs of different patients. Various studies have reinforced that diabetes self-management education and continued support improves diabetes outcomes.^[31,32]

Finally, this study has shown that it is possible to measure DSPD in a busy clinical setting using PAID. The acceptability of the questionnaire was demonstrated by the high participation, very few declining to participate, and the willingness of patients to complete it again. PAID has been quoted by NICE and ADA guidelines for the assessment of psychological distress in diabetes.^[7] Diabetes management plans should incorporate both glycaemic control and psychological well-being.^[33] This preliminary data suggests that PAID is a valuable screening tool for DSPD, and may thus facilitate counselling on the specific concerns of patients to help them cope better with their diabetes.

The study is not without limitations. Firstly, the cross-sectional nature limits the ability to interpret the causal factors. Secondly, the socio-demographic and clinical data were self-reported by the patients. The reliability of some findings can be debated, especially the high level of medication adherence. In addition, although the Tamil questionnaire was translated by two independent bi-lingual individuals, a study to validate the questionnaire statistically would have been better.

Further longitudinal studies are required to understand the effect of interventions to address the individual concerns expressed by the patients in the PAID questionnaire, on coping abilities, long-term glycaemic control and complications of diabetes.

Conclusions

This cross-sectional study showed that one-third of the T2DM patients had DSPD. The prevalence was significantly higher in younger individuals and in those with retinopathy. It was also noted that one-third of the patients were likely to be psychologically distressed regardless of their socio-demographic or clinical characteristics. Hence, to ensure good adherence to diabetic care plans, it is necessary to screen all the patients with T2DM for psychological well-being. PAID is an easy, well-accepted questionnaire by the patients. It may help in identifying psychosocial barriers affecting diabetes management, which need to be addressed to improve outcomes. We recommend linking psychological screening into the guidelines of diabetes care for better outcomes of patients with diabetes.

Key points

- About one-third of the patients with T2DM have DSPD.
- Younger age and diabetic retinopathy were significant risk factors associated with increased psychological distress. Worrying about future complications was the most commonly reported problem.
- The PAID scale is a well-accepted, easy-to-use tool for the assessment of DSPD in Indian patients.
- Future studies are needed to assess the impact of individualized patient education based on the problem areas identified, on their QoL and long-term clinical outcomes.

New message

Though rarely assessed, DSPD is a significant problem affecting one-third of the patients with T2DM. The PAID scale is an acceptable and easy-to-use tool for the evaluation of DSPD in Indian patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given consent for their clinical information to be reported in the journal

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Conflicts of interest

There are no conflicts of interest.

References

1. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res* 2007;125:217-30.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047-53.
3. India State-Level Disease Burden Initiative Diabetes Collaborators. The increasing burden of diabetes and variations among the states of India: the Global Burden of Disease Study 1990-2016. *Lancet Glob Health* 2018;6:e1352-e1362. doi: 10.1016/S2214-109X(18)30387-5.
4. Gupta R, Misra A. Review: Type 2 diabetes in India: Regional disparities. *Br J Diabetes Vasc Dis* 2007;7:12-6.
5. Deepa M, Pradeepa R, Rema M, Mohan A, Deepa R, Shanthirani S, *et al.* The Chennai Urban Rural Epidemiology Study (CURES)-study design and methodology (urban component) (CURES-I). *J Assoc Physicians India* 2003;51: 863-70.
6. Virtanen M, Ferrie JE, Tabak AG, Akbaraly TN, Vahtera J, Singh-Manoux A, *et al.* Psychological distress and incidence of type 2 diabetes in high-risk and low-risk populations: The Whitehall II Cohort Study. *Diabetes Care* 2014;37:2091-7.
7. Kalra S, Sridhar GR, Balhara YP, Sahay RK, Bantwal G, Baruah MP, *et al.* National recommendations: Psychosocial management of diabetes in India. *Indian J Endocrinol Metab* 2013;17:376-95.
8. Polonsky WH, Anderson BJ, Lohrer PA, Welch G, Jacobson AM, Aponte JE, *et al.* Assessment of diabetes-related distress. *Diabetes Care* 1995;18:754-60.
9. Lloyd CE, Pouwer F, Hermanns N, editors. Screening for Depression and Other Psychological Problems in Diabetes: A Practical Guide. London: Springer-Verlag; 2013.
10. Polonsky WH. Understanding and assessing diabetes-specific quality of life. *Diabetes Spectr* 2000;13:36.
11. Sridhar GR. Psychiatric co-morbidity & diabetes. *Indian J Med Res* 2007;125:311-20.
12. Welch GW, Jacobson AM, Polonsky WH. The Problem Areas in Diabetes scale. An evaluation of its clinical utility. *Diabetes Care* 1997;20:760-6.
13. Lee EH, Lee YW, Lee KW, Kim YS, Nam MS. Measurement of diabetes-related emotional distress using the Problem Areas in Diabetes scale: Psychometric evaluations show that the short form is better than the full form. *Health Qual Life Outcomes* 2014;12:142.
14. Welch G, Weinger K, Anderson B, Polonsky WH. Responsiveness of the Problem Areas in Diabetes (PAID) questionnaire. *Diabet Med* 2003;20:69-72.
15. Snoek FJ, Pouwer F, Welch GW, Polonsky WH. Diabetes-related emotional distress in Dutch and U.S. diabetic patients: Cross-cultural validity of the problem areas in diabetes scale. *Diabetes Care* 2000;23:1305-9.
16. Greenland S. Dose-response and trend analysis in epidemiology: Alternative to categorical analysis. *Epidemiology* 1995;6:356-65.
17. Hosmer DW, Hosmer T, Le Cessie S, Lemeshow S. A comparison of goodness-of-fit tests for the logistic regression model. *Stat Med* 1997;16:965-80.
18. Pulkstenis E, Robinson TJ. Two goodness-of-fit tests for logistic regression models with continuous covariates. *Stat Med* 2002;21:79-93.
19. Jannoo Z, Yap B, Razali N, Gnanasan S, Hassali M, Shafie A, *et al.* Examining the Problem Areas In Diabetes scale (MY-PAID-20) among Malay T2DM patients. *Int J Bio and Biomed Engineering* 2014;8:157-63.
20. Hermanns N, Kulzer B, Krichbaum M, Kubiak T, Haak T. How to screen for depression and emotional problems in patients with diabetes: Comparison of screening characteristics of depression questionnaires, measurement of diabetes-specific emotional problems and standard clinical assessment. *Diabetologia* 2006;49:469-77.
21. Sankar P, Sasikumar P, Medayil R, Jacob R, Sasidharan S. High prevalence of distress among patients with Type 2 diabetes (T2DM)—A hospital-based, cross-sectional study from South India. *Diabetes* 2018;67(Supplement 1):61-LB. doi: 10.2337/db18-61-LB.
22. Amsberg S, Wredling R, Lins P, Adamson U, Johansson U. The psychometric properties of the Swedish version of the Problem Areas in Diabetes Scale (Swe-PAID-20): Scale development. *Int J Nurs Stud* 2008;45:1319-28.
23. Reddy J, Wilhelm K, Campbell L. Putting PAID to diabetes-related distress: The potential utility of the problem areas in diabetes (PAID) scale in patients with diabetes. *Psychosomatics* 2013;54:44-51.
24. Fisher L, Mullan JT, Skaff MM, Glasgow RE, Arean P, Hessler D. Predicting diabetes distress in patients with Type 2 diabetes: A longitudinal study. *Diabet Med* 2009;26:622-7.
25. Baradaran HR, Mirghorbani S, Javanbakht A, Yadollahi Z, Khamseh ME. Diabetes distress and its association with depression in patients with type 2 diabetes in Iran. *Int J Prev Med* 2013;4:580-4.
26. Delahanty LM, Grant RW, Wittenberg E, Bosch JL, Wexler DJ, Cagliero E, *et al.* Association of diabetes-related emotional distress with diabetes treatment in primary care patients with Type 2 diabetes. *Diabet Med* 2007;24:48-54.
27. Stoop CH, Nefs G, Pop VJ, Wijnands-van Gent CJ, Tack CJ, Geelhoed-Duijvestijn PH, *et al.* Diabetes-specific emotional distress in people with Type 2 diabetes: A comparison between primary and secondary care. *Diabet Med* 2014;31:1252-9.
28. Fenwick E, Rees G, Pesudovs K, Dirani M, Kawasaki R, Wong TY, *et al.* Social and emotional impact of diabetic retinopathy: A review. *ClinExpOphthalmol* 2012;40:27-38.
29. Huyser KR, Manson SM, Nelson LA; Noonan C, Roubideaux Y; Special Diabetes Program; Indians Healthy Heart Demonstration Project. Serious psychological distress and diabetes management among American Indians and Alaska Natives. *Ethn Dis* 2015;25:145-51.
30. Collins MM, Corcoran P, Perry IJ. Anxiety and depression symptoms in patients with diabetes. *Diabet Med* 2009;26:153-61.
31. Parildar H, Cigerli O, Demirag NG. Depression, coping strategies, glycaemic control and patient compliance in Type 2 diabetic patients in an endocrine outpatient clinic. *Pak J Med Sci* 2015;31:19-24.
32. Hopkins D, Lawrence I, Mansell P, Thompson G, Amiel S, Campbell M, *et al.* Improved biomedical and psychological outcomes 1 year after structured education in flexible insulin therapy for people with type 1 diabetes: The U.K. DAFNE experience. *Diabetes Care* 2012;35:1638-42.
33. Miller ST, Elasy TA. Psychometric evaluation of the Problem Areas in Diabetes (PAID) survey in Southern, rural African American women with Type 2 diabetes. *BMC Public Health* 2008;22:70.